SEQUENCE LISTING

<110>   Sturmer, Rainer
        Kesseler, Maria
        Hauer, Bernhard
        Friedrich, Thomas
        Breuer, Michael

<120>   Methods for the production of
        3-methylamino-1-(thiene-2-yl)-propane-1-ol

<130>   13111-00035-US

<140>   US/10/573,130
<141>   2006-03-23

<150>   PCT/EP2004/010939
<151>   2004-09-30

<150>   DE 103 45 772.0
<151>   2003-10-01

<160>   44

<170>   PatentIn version 3.3

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<212>   PRT

<213>   Lactobacillus brevis

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Met Ser Asn Arg Leu Asp Gly Lys Val Ala Ile Val Thr Gly Gly Thr
1   5   10   15
Leu Gly Ile Gly Leu Ala Ile Ala Thr Lys Phe Val Glu Glu Gly Ala
            20   25   30
Lys Val Met Ile Thr Gly Arg His Ser Asp Val Gly Glu Lys Ala
        35   40   45

<210>   2

<211>   18

<212>   PRT

<213>   Candida magnoliae

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Phe Ile
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<211> 756

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<213> Lactobacillus brevis

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1               5                   10                  15
ttg ggt atc ggt tta gct atc gcc acg aag ttc gtt gaa gaa ggg gct      96
Leu Gly Ile Gly Leu Ala Ile Ala Thr Lys Phe Val Glu Glu Gly Ala
            20                  25                  30
aag gtc atg att acc ggc cgg cac agc gat gtt ggt gaa aaa gca gct     144
Lys Val Met Ile Thr Gly Arg His Ser Asp Val Gly Glu Lys Ala Ala
        35                  40                  45
aag agt gtc ggc act cct gat cag att caa ttt ttc caa cat gat tct     192
Lys Ser Val Gly Thr Pro Asp Gln Ile Gln Phe Phe Gln His Asp Ser
    50                  55                  60
tcc gat gaa gac ggc tgg acg aaa tta ttc gat gca acg gaa aaa gcc     240
Ser Asp Glu Asp Gly Trp Thr Lys Leu Phe Asp Ala Thr Glu Lys Ala
65                  70                  75                  80
ttt ggc cca gtt tct aca tta gtt aat aac gct ggg atc gcg gtt aac     288
Phe Gly Pro Val Ser Thr Leu Val Asn Asn Ala Gly Ile Ala Val Asn
                85                  90                  95
aag agt gtc gaa gaa acc acg act gct gaa tgg cgt aaa cta tta gcc     336
Lys Ser Val Glu Glu Thr Thr Thr Ala Glu Trp Arg Lys Leu Leu Ala
            100                 105                 110
gtc aac ctt gat ggt gtc ttc ttc ggt acc cga tta ggg att caa cgg     384
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
        115                 120                 125
atg aag aac aaa ggc tta ggg gct tcc atc atc aac atg tct tcg atc     432
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
    130                 135                 140
gaa ggc ttt gtg ggt gat cct agc tta ggg gct tac aac gca tct aaa     480
Glu Gly Phe Val Gly Asp Pro Ser Leu Gly Ala Tyr Asn Ala Ser Lys
145                 150                 155                 160
ggg gcc gta cgg att atg tcc aag tca gct gcc tta gat tgt gcc cta     528
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
                165                 170                 175
aag gac tac gat gtt cgg gta aac act gtt cac cct ggc tac atc aag     576
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Tyr Ile Lys
                180                 185                 190
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aca cca ttg gtt gat gac cta cca ggg gcc gaa gaa gcg atg tca caa    624
Thr Pro Leu Val Asp Asp Leu Pro Gly Ala Glu Glu Ala Met Ser Gln
        195             200             205
cgg acc aag acg cca atg ggc cat atc ggt gaa cct aac gat att gcc    672
Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
    210             215             220
tac atc tgt gtt tac ttg gct tct aac gaa tct aaa ttt gca acg ggt    720
Tyr Ile Cys Val Tyr Leu Ala Ser Asn Glu Ser Lys Phe Ala Thr Gly
225             230             235             240
tct gaa ttt gta gtt gac ggt ggc tac act gct caa                    756
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<213> Lactobacillus brevis

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Leu Gly Ile Gly Leu Ala Ile Ala Thr Lys Phe Val Glu Glu Gly Ala
            20              25              30
Lys Val Met Ile Thr Gly Arg His Ser Asp Val Gly Glu Lys Ala Ala
        35              40              45
Lys Ser Val Gly Thr Pro Asp Gln Ile Gln Phe Phe Gln His Asp Ser
    50              55              60
Ser Asp Glu Asp Gly Trp Thr Lys Leu Phe Asp Ala Thr Glu Lys Ala
65              70              75              80
Phe Gly Pro Val Ser Thr Leu Val Asn Asn Ala Gly Ile Ala Val Asn
                85              90              95
Lys Ser Val Glu Glu Thr Thr Thr Ala Glu Trp Arg Lys Leu Leu Ala
            100             105             110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
        115             120             125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
    130             135             140
Glu Gly Phe Val Gly Asp Pro Ser Leu Gly Ala Tyr Asn Ala Ser Lys
145             150             155             160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
                165             170             175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Tyr Ile Lys
            180             185             190
Thr Pro Leu Val Asp Asp Leu Pro Gly Ala Glu Glu Ala Met Ser Gln
        195             200             205
Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
    210             215             220
Tyr Ile Cys Val Tyr Leu Ala Ser Asn Glu Ser Lys Phe Ala Thr Gly
225             230             235             240
Ser Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
            245             250
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att aag ctc gcc gag gag ggc tac agc gtc acg att gcg tct cgc ggc      96
Ile Lys Leu Ala Glu Glu Gly Tyr Ser Val Thr Ile Ala Ser Arg Gly
                20                  25                  30
ctt aag cag ctc gag gct gtg aag gcc aaa cta ccc att gtg aag cag     144
Leu Lys Gln Leu Glu Ala Val Lys Ala Lys Leu Pro Ile Val Lys Gln
            35                  40                  45
gga cag gtt cac cac gtg tgg cag ctt gat ctc agt gat gtc gac gct     192
Gly Gln Val His His Val Trp Gln Leu Asp Leu Ser Asp Val Asp Ala
        50                  55                  60
gcg gcc gcc ttc aaa ggg tcg ccg cta cct gcc agc cgc tac gac gtg     240
Ala Ala Ala Phe Lys Gly Ser Pro Leu Pro Ala Ser Arg Tyr Asp Val
65                  70                  75                  80
ctc gtc agc aat gct ggc gtg gcc cag ttt agc ccg ttc atc gag cat     288
Leu Val Ser Asn Ala Gly Val Ala Gln Phe Ser Pro Phe Ile Glu His
                85                  90                  95
gcg aag cag gac tgg tcg cag atg ctt gcc atc aat ctg gcg gca ccc     336
Ala Lys Gln Asp Trp Ser Gln Met Leu Ala Ile Asn Leu Ala Ala Pro
            100                 105                 110
att gcg ctg gcc cag aca ttt gct aag gcc att ggc gac aag ccg cgc     384
Ile Ala Leu Ala Gln Thr Phe Ala Lys Ala Ile Gly Asp Lys Pro Arg
        115                 120                 125
aac aca ccg gcc cac att gtg ttt gtc tcg tcg aac gtc tcg ttg cga     432
Asn Thr Pro Ala His Ile Val Phe Val Ser Ser Asn Val Ser Leu Arg
    130                 135                 140
ggc ttc ccg aac atc ggc gtc aac tcc atc acc ccc ggc a               472
Gly Phe Pro Asn Ile Gly Val Asn Ser Ile Thr Pro Gly
145                 150                 155
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<213> Candida magnoliae

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Ile Lys Leu Ala Glu Glu Gly Tyr Ser Val Thr Ile Ala Ser Arg Gly
            20                  25              30
Leu Lys Gln Leu Glu Ala Val Lys Ala Lys Leu Pro Ile Val Lys Gln
            35                  40              45
Gly Gln Val His His Val Trp Gln Leu Asp Leu Ser Asp Val Asp Ala
    50              55                  60
Ala Ala Ala Phe Lys Gly Ser Pro Leu Pro Ala Ser Arg Tyr Asp Val
65              70                  75                  80
Leu Val Ser Asn Ala Gly Val Ala Gln Phe Ser Pro Phe Ile Glu His
                85                  90                  95
Ala Lys Gln Asp Trp Ser Gln Met Leu Ala Ile Asn Leu Ala Ala Pro
            100             105                 110
Ile Ala Leu Ala Gln Thr Phe Ala Lys Ala Ile Gly Asp Lys Pro Arg
            115             120                 125
Asn Thr Pro Ala His Ile Val Phe Val Ser Ser Asn Val Ser Leu Arg
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Gly Phe Pro Asn Ile Gly Val Asn Ser Ile Thr Pro Gly
145             150                 155
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Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
1               5                   10
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Ser Thr Thr Ser Asn Ala Leu Val Thr Gly Gly Ser Arg Gly Ile Gly
1   5   10   15

Ala Ala

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<213> Candida magnoliae

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Ile Gly Val Asn Ser Ile Asn Pro Gly
1   5

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Ser Asn Arg Leu Asp Gly Lys Val Ala Ile Val Thr Gly Gly Thr Leu
1   5   10   15

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Gly Ile Gly Leu Ala Ile Ala Thr Lys Phe Val Glu Glu Gly Ala Lys
            20                      25                  30
Val Met Ile Thr Gly Arg His Ser Asp Val Gly Glu Lys Ala Ala Lys
            35                      40                  45
Ser Val Gly Thr Pro Asp Gln Ile Gln Phe Phe Xaa
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Arg Arg Xaa Xaa
            20


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1               5                   10                  15


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Asp Glu Asp Gly
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1                   5                   10                  15


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Ala Phe Ile Pro Gly Lys Arg
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1               5                   10                  15


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Ser Ala Ala Leu Asp Xaa Ala Leu Lys Asp Tyr Xaa Val Arg Xaa Xaa
1               5                   10                  15
Xaa Xaa
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Ser Ala Ala Leu Asp Xaa Ala Leu Lys Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1               5                   10                  15
Xaa



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Lys Leu Leu Ala Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Xaa
1               5                   10                  15
Xaa Xaa Xaa Xaa
            20



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<223>  Xaa is unknown

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Xaa Met Xaa Thr Gly Arg
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<210>  27
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<222>  (15)..(15)
<223>  Amino acid is Ala or unknown

<400>  27

Thr Lys Thr Pro Met Gly His Ile Xaa Glu Pro Asn Xaa Ile Ala
1               5                   10                  15


<210>  28
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<213>  Lactobacillus brevis


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<223>  Amino acid is Thr or Ala
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<223>  Amino acid is Pro, Gly, or Leu

<220>
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<223>  Amino acid is Met, Ser, or Asp

<220>
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<223>  Amino acid is Gly, Glu, or Cys (unsure)

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<220>
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<223>  Amino acid is Ala (unsure), Val, or Lys

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Thr Lys Thr Pro Met Gly Xaa Ile Ala Glu Pro Asn Asp Ile Ala Tyr
1   5   10   15
Xaa Xaa Xaa Xaa
            20

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<211> 25
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<213> Lactobacillus brevis

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<223> Amino acid is Ala or Gly

<220>
<221> VARIANT
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<223> Amino acid is Ala or Leu

<220>
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<223> Amino acid is Lys or Phe

<220>
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<222> (5)..(5)
<223> Amino acid is Ser, Leu, or Arg

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<223>   Amino acid is Pro or Arg


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<223>   Amino acid is Gln, Ala, or Glu


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<223>   Amino acid is Ile or Thr


<220>
<221>   VARIANT
<222>   (13)..(13)
<223>   Amino acid is Gln or Val


<220>
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<220>
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<223>   Amino acid is Gln or Gly


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<223>   Amino acid is His or Tyr


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<223>   Amino acid is Asp or Ile


<220>
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<222>   (19)..(19)
<223>   Amino acid is Ser, Lys, or Asp


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<223>   Amino acid is Ser or Ala
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<223> Amino acid is Val (unsure) or Ala

<220>
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<223> Amino acid is Val (unsure) or Asn

<220>
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<222> (25)..(25)

<400> 29
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Lys Ala Ala Lys Ser Val Gly Thr Pro Asp Gln Ile Gln Phe Phe Gln
1               5                   10                  15
His Asp Ser Ser Pro Glu Val Val Gln
            20                  25
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<210> 30
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<212> PRT
<213> Lactobacillus brevis

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<223> Amino acid is Leu or Ala

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<223> Amino acid is unknown, Ile, or Asp

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<222> (11)..(20)
<223> Xaa is unknown
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<400>  30

Xaa Val Lys Leu Leu Ala Val Asn Leu Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1               5                   10                  15
Xaa Xaa Xaa Xaa
            20


<210>  31
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<213>  Lactobacillus brevis


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<220>
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<223>  Amino acid is Phe or Val

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<223>  Amino acid is Gly (unsure) or Thr

<220>
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<223>  Amino acid is Leu or Val

<220>
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<223>  Amino acid is Lys or His

<220>
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<222>  (8)..(8)
<223>  Amino acid is Gln or Pro

<220>
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<223>  Amino acid is Asn or Gly

<220>
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<223>  Amino acid is Ile or Tyr
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<223>  Amino acid is Glu or Ile

<220>
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<220>
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<220>
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<223>  Amino acid is Asn or Pro

<220>
<221>  VARIANT
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<220>
<221>  VARIANT
<222>  (16)..(16)
<223>  Amino acid is Ala, Met, Gly, or Val

<220>
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<222>  (17)..(17)
<223>  Amino acid is Ala or Asp

<220>
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<223>  Amino acid is Val or Asp

<220>
<221>  VARIANT
<222>  (19)..(19)
<223>  Amino acid is Arg, Asp, or Leu

<220>
<221>  Unsure
<222>  (20)..(20)


<400>  31

Thr Val Phe Phe Gly Leu Lys Gln Asn Ile Glu Asn Ile Asn Ile Ala
1                   5                   10                  15
Ala Val Arg Pro
            20
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<210>  32
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<213>  Lactobacillus brevis


<220>
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<220>
<221>  VARIANT
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<223>  Amino acid is Phe, Val, or Ser

<220>
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<223>  Amino acid is Val or Leu

<220>
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<223>  Amino acid is Asp, Ala, or Ile

<220>
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<223>  Amino acid is Pro, Gln, or Tyr

<220>
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<220>
<221>  VARIANT
<222>  (8)..(8)
<223>  Amino acid is Leu, Met, or Ala

<220>
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<223>  Amino acid is Gly or Lys

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<223>  Amino acid is Tyr, Gly, or Lys

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<220>
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<223>    Amino acid is Gly, Ser, or Arg


<220>
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<220>
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<223>    Amino acid is Gly, Met, or Ser


<220>
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<223>    Amino acid is Ala or Ile


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<223>    Amino acid is Val or Lys


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<223>    Amino acid is Arg or Asn


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<221>    VARIANT
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<223>    Amino acid is Ile, Met, or Ala


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<222>    (28)..(28)


<220>
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<222>    (29)..(30)
<223>    Xaa is unknown


<400>    32


Gly Phe Val Gly Asp Pro Ser Leu Gly Ala Tyr Asn Ala Gly Lys Gly
1               5                   10                  15
Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Xaa Xaa
            20                  25                  30
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<210>   33
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<212>   PRT
<213>   Lactobacillus brevis


<220>
<221>   misc_feature
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<400>   33

Phe Val Val Asp Xaa Xaa Xaa Xaa Xaa Xaa
1                5                   10


<210>   34
<211>   20
<212>   PRT
<213>   Lactobacillus brevis


<220>
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<223>   Amino acid is Gly, Lys, or Tyr

<220>
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<223>   Xaa is unknown, Leu (unsure), or Phe (unsure)

<220>
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<220>
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<220>
<221>   VARIANT
<222>   (8)..(8)
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<220>
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<220>
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<222>  (13)..(20)
<223>  Xaa is unknown

<400>  34

Asp Gly Xaa Thr Lys Leu Phe Asp Ala Thr Glu Glu Xaa Xaa Xaa Xaa
1               5                   10                  15
Xaa Xaa Xaa Xaa
            20


<210>  35
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<212>  PRT
<213>  Lactobacillus brevis


<220>
<221>  misc_feature
<222>  (11)..(14)
<223>  Xaa is unknown

<400>  35

Phe Val Val Asp Gly Gly Tyr Thr Ala Gln Xaa Xaa Xaa Xaa
1               5                   10


<210>  36
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<213>  Lactobacillus brevis


<220>
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<223>  Xaa is unknown

<220>
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<223>  Amino acid is Ala or Ser

<220>
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<223>   Amino acid is Val (unsure) or Asp


<220>
<221>   VARIANT
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<223>   Amino acid is Glu or Gly (unsure)


<400>   36

Xaa Ala Leu Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly
1               5                   10                  15
Tyr Ile Lys Thr Pro Leu Val Val Asp Leu Pro Gly Ala Glu
            20                  25                  30



<210>   37
<211>   15
<212>   PRT
<213>   Lactobacillus brevis


<400>   37

Lys Ala Ala Lys Ser Val Gly Thr Pro Asp Gln Ile Gln Phe Phe
1               5                   10                  15



<210>   38
<211>   13
<212>   PRT
<213>   Lactobacillus brevis


<400>   38

Gly Ala Lys Val Met Ile Thr Gly Arg His Ser Asp Val
1               5                   10



<210>   39
<211>   10
<212>   PRT
<213>   Lactobacillus brevis


<220>
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<223>   Amino acid is Thr, Phe, or Ile


<220>
<221>   VARIANT
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<220>
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<220>
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<223>   Amino acid is Glu or Leu


<400>   39

Ser Lys Phe Ala Thr Gly Ser Glu Phe Val
1                5                   10


<210>   40
<211>   25
<212>   PRT
<213>   Lactobacillus brevis


<220>
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<220>
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<220>
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<223>   Amino acid is Val, Phe, or Leu

<220>
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<223>   Amino acid is Arg, Lys, or Gly

<220>
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<220>
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<223>   Amino acid is Lys or Gly
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<223>  Amino acid is Thr or Ala

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<223>  Amino acid is Asp or Met

<220>
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<400>  40

Xaa Asp Val Arg Val Asn Thr Val His Pro Gly Tyr Ile Lys Thr Pro
1               5                   10                  15
Leu Val Asp Asp Leu Pro Gly Ala Glu
            20              25


<210>  41
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<212>  PRT
<213>  Lactobacillus brevis


<220>
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<222>  (36)..(38)

<220>
<221>  misc_feature
<222>  (39)..(40)
<223>  Xaa is unknown

<400>  41

Trp Xaa Lys Leu Leu Ala Val Asn Leu Asp Gly Val Phe Phe Gly Thr
1               5                   10                  15
Arg Leu Gly Ile Gln Arg Met Lys Asn Lys Gly Leu Gly Ala Ser Ile
            20                  25                  30
Ile Asn Met Ser Ser Ile Xaa Xaa
            35                  40
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<210>  42
<211>  40
<212>  PRT
<213>  Lactobacillus brevis


<220>
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<220>
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<223>  Amino acid is Gln, Leu, Lys, or Glu

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<220>
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<220>
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<223>  Amino acid is Pro or Leu

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<220>
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<222>  (12)..(12)
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<220>
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<222>  (13)..(13)
<223>  Amino acid is Ile, Phe, Ala, or Gln


<220>
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<222>  (14)..(14)
<223>  Amino acid is Gly (unsure) or Phe


<220>
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<223>  Amino acid is Glu or Gly


<220>
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<220>
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<220>
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<220>
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<220>
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<223>  Amino acid is Ala or Ile


<220>
<221>  VARIANT
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<223>  Amino acid is Tyr or Gln


<220>
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<223>  Amino acid is Tyr or Asn


<220>
<221>  VARIANT
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<223>  Amino acid is Ala or Gly
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<220>
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<222> (37)..(39)
<223> Xaa is unknown

<400> 42

Ala Met Ser Gln Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro
1   5   10   15
Asn Asp Ile Ala Tyr Arg Met Lys Tyr Lys Ala Leu Gly Ala Ser Ile
            20   25   30
Ile Asn Met Ser Xaa Xaa Xaa Gly
        35   40

<210> 43
<211> 15
<212> PRT
<213> Lactobacillus brevis

<220>
<221> misc_feature
<222> (12)..(15)
<223> Xaa is unknown

<400> 43

Ser Lys Phe Ala Thr Gly Ser Glu Phe Val Val Xaa Xaa Xaa Xaa
1   5   10   15

<210> 44
<211> 15
<212> PRT
<213> Lactobacillus brevis

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<223> Amino acid is Ala or Thr

<220>
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<222> (5)..(5)
<223> Amino acid is Thr, Ile, or Pro

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<223> Amino acid is Gly, Leu, or Asp

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<223> Amino acid is Phe or Gln

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<223> Amino acid is Asp, Gln, or Lys

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<222> (13)..(15)
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<400>  44

Ser Lys Phe Ala Thr Gly Ser Glu Phe Val Val Asp Xaa Xaa Xaa
1               5                   10                  15
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